NorCalSETACNews

Newsletter of the Northern California Regional Chapter of the Society of Environmental Toxicology and Chemistry.....Spring 2008

Open Letter to the NorCal SETAC membership: Your input is needed.

Dear Member,

Over the past year (late 2007 and early 2008), our NorCal SETAC Chapter has experienced some challenges. Here are a few facts:

- Four of our officers, including two presidents, have resigned from their positions since June 2007 due to significant changes to their jobs.
- A new Board of Directors has been elected, with only two remaining members from previous years. Two additional members extended their participation on the Board for a period of time to facilitate the transition of so many new members joining the Board at the same time.
- The fall 2007 dinner meeting, a highly publicized cruise and talk on the Delta, had inadequate participation and had to be cancelled.
- Our treasury is low on funds, causing the postponement of the call for research scholarship applications, usually solicited in late summer.
- The planning horizon for the 2008 Annual Meeting was significantly reduced due to the need to elect new Board Members prior to beginning the planning process.

We are not sure of the significance of this constellation of events. It is possible it simply reflects a series of unfortunate incidents. It might, on the other hand, reflect something more significant about the role of our local chapter in meeting the needs of our membership.

We believe that our organization needs to take a bit of time to assess where we want to go and what we might want to change in order to ensure a bright and productive future. For that reason we have created a brief survey that will provide us with your input and ideas regarding NorCal SETAC. We would appreciate you taking a few minutes to answer several questions that we hope will help us build a stronger chapter that serves the needs and interests of the members. To access this survey, please click on the following link:
http://www.surveymonkey.com/s.aspx?sm=aQah_2bQul5yD6u9DJIqLtaA_3d_3d.

The new Board has been working to put together our annual meeting in May, which will be a great event. We hope to see many of you there, and we look forward to your feedback and the ongoing opportunity to support your intellectual, professional, and networking goals.

Thank you,

The 2008 Norcal SETAC Board of Directors

In this Issue.....

Newsletter Production

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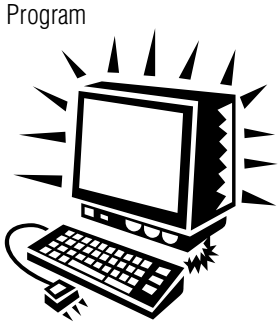

Current NorCal SETAC Newsletter policy is to not solicit commentaries, but to consider printing commentaries as letters to the editor or as special sections when they are submitted and appropriate.

NorCal SETAC

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www.norcalsetac.org

Website Features

Thanks to The Village.com, we have a new and updated website for NorCal SETAC. The website no longer has the previous "members only" area in order to provide open and easy access to all content. However, please register at the new website to take advantage of upcoming options, such as posting content. New registration is required since previous usernames and passwords no longer apply. Let us know how the website works for you and what content or features you would like to see.

Thanks—Beckye Stanton

On our website:

- **Meeting Announcements and Newsletters**
- **Student Awards and Scholarships**
- **Sustaining Members**
- **Board of Directors**
- **Overall Goals and Purposes**
- **Job Postings**

Newsletter Advertising Rates

Size	Dimensions	Rate/ 1 issue	Rate/3 issues	Annual Package*
Business card	2" x 3.5"	$20	$50	$80
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1/4 page	3.5" x 4.75"	$50	$125	$200
1/2 page	7.5" x 4.75"	$100	$250	$400
1 page	7.5" x 10"	$200	$500	$800

*Annual Package: 3 issues+ Annual Program+ Membership Directory

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This newsletter is published three times per year and circulated to all members This distribution is an excellent opportunity for your company to advertise its services or products to the appropriate audience.

Advertising rates can be found in the table to the left. Please contact Eugenia McNaughton, Chairman of the Media Committee for information. mcnaughton.eugenia@cpa.gov

18th Annual Meeting
May 7-8, 2008
Northern California Chapter
Society of Environmental Toxicology And Chemistry

Speakers, Dr. Ken Caldeira & Dr. Cymie Payne

Environmental Stewardship in the Context of Global Climate Change: Physical, Chemical, Biological, and Social Forces

Clark Kerr Campus, UC Berkeley

A conference to broaden understanding of issues related to the effects of climate change on global and local environmental sciences and policy, and the developing relationships to toxicology and chemistry.

MAY 7: SHORT COURSES

Performing Ecological Risk Assessments in California: Understanding Requirements of California Agencies
Dr. Michael Anderson, CA Department of Fish and Game, OSPR

Analytical Chemistry: A Guide to Sample Collection, Analysis, and Data Interpretation
Dr. Gregory Salata, Columbia Analytical Services

Implementing CETIS in Your Environmental Toxicology Laboratory (morning) **and CETIS Report Interpretation with Emphasis on Statistics and NPDES Reporting** (afternoon)
Dr. Michael Ives, Tidepool Software

Program and Registration at
www.norcalsetac.org
Student discounts available

MAY 8: PLENARY SESSION, PLATFORMS & POSTERS

Plenary Speakers:

Dr. Ken Caldeira
Stanford University
Carbon Dioxide, Ocean Acidification, and Coral Reefs

Dr. Cymie Payne
UC Berkeley, Boalt Law School
Prospects for Climate Policy: Governing a Global Commons

Steve Goldbeck
San Francisco BCDC
Global Climate Change Impacts on San Francisco Bay

Dr. Robert Coats
Hydroikos, LTD.
Climate Change in the Tahoe Basin: Regional Trends and Biogeochemical Impacts

Platform and Poster Sessions include a wide variety of topics, e.g., updates on California's Sediment Quality Objectives, "new" chemicals in fish and wildlife, and results of ongoing fish and contaminant studies in CA waterways.

Support NorCal SETAC: Become a Sustaining Member

Dear Sir or Madam,

On behalf of the Board of Directors of the Northern California Chapter of the Society of Environmental Toxicology and Chemistry (NorCal SETAC), I would like to invite you and your organization to support our Chapter as a Sustaining Member. As you know, we recently held elections for the Board and are excited to have a new group of highly capable and enthusiastic members.

In an effort to expand our outreach and support to members and students, we are expanding sustaining membership opportunities as well as broadening support for undergraduate and graduate students. It is our goal to enhance the role NorCal SETAC plays in promoting scientific debate and educational opportunities in the environmental sciences in northern California.

With respect to the sustaining memberships, we will be offering three levels of support:

Gold Level involves a yearly pledge of $1500;

Silver Level supports the chapter with $750/year;

and Bronze Level supporters contribute $350/year.

These funds will be used to enhance our annual spring meeting as well as support other chapter functions such as the new website we are planning, provide resources for special educational programs such as the fall dinner meeting and workshops at the annual meeting, as well as meet general operating expenses. Without the generous support from you and other sustaining members, our chapter would be unable to provide the local scientific community with the programs and educational opportunities that we sponsor. We appreciate your previous support and hope you will consider expanding your contribution to our chapter this year. If these levels do not fit your organization's ability to support the chapter, please let me know and we can discuss other levels of support. Your sustaining membership comes with several benefits, including chapter membership for you or another person in your organization, recognition in the annual meeting program and at the annual meeting, sustaining members lunch at the annual meeting, free advertising space in the newsletter, and acknowledgement on the NorCal SETAC website, currently undergoing redesign for improved outreach and user-friendliness.

We also are offering a new opportunity for sustaining members to demonstrate their commitment to advancing education in the environmental sciences by broadening our scholarship program for qualified undergraduate and graduate students. As I am sure you are aware, research funds that students have used to support their studies in the past are not as readily available today. At some of the federal agencies that offer grants to research laboratories, the funding rate has dipped to below 10%. We would like to increase the help we provide to students pursuing degrees in toxicology, chemistry, and the environmental sciences in general. To that end, we plan to expand the research scholarship opportunities NorCal SETAC offers students. In the past we have offered two or three competitive research scholarships to undergraduate and graduate students. Funds for these grants have been derived from membership fees and the revenues from the annual meeting. To expand the scholarship program, we are asking for your support. We have a few options:

- We would like to establish research scholarships in the name(s) of companies that are willing to contribute to the scholarship fund at the level of $3000 for graduate scholarships or $1000 for undergraduate scholarships. The scholarship will be named for your

organization and you have the option to specify the area of research for the recipient.

- If your organization is unable to commit at these levels, lesser donations towards scholarships will be pooled into NorCal SETAC Research Scholarships and awarded as in the past. All contributing organizations will be recognized.

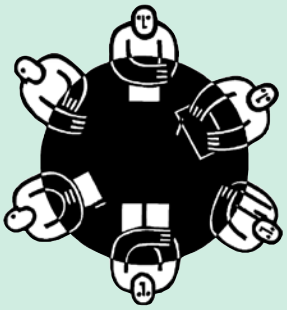
The more contributions we have to the scholarship fund, the more awards we will make, and this may vary from one year to the next. Scholarships are typically awarded at the annual meeting, and it is our intent that a representative of each sponsor will make the award at the Plenary Session of the meeting. The contribution will further be recognized on the Chapter's website as well as in the Globe, the newsletter of SETAC NA. We are hopeful that your business or consulting company is in a position to make a contribution to this worthwhile effort. Because our fundraising effort is so close to the annual meeting this year, scholarship applications will be solicited and awards will be made later in the year for 2008, perhaps at a dinner meeting or another chapter event.

You are invited to support our chapter as a sustaining member, scholarship sponsor, or both. NorCal SETAC is a non-profit organization, and we will send a receipt for your contribution. Please feel free to contact me or any of the Board members to discuss.

Very truly yours,

Judy Nedoff

President
NorCal SETAC



2008 Sustaining Members
(as of April 2008)

GOLD Level

TheVillage.com

Columbia Analytical Services

Arcadis BBL

Silver Level

Clorox

Sierra Foothill Laboratory

Bronze Level

San Francisco Estuary Institute

City of San Jose ESD

Pacific EcoRisk

Weston MEC

Block Environmental

AQUA Science

Please see the Sustaining Member Application Form on Page 19

Diversified Perspectives

Bay-Delta Mercury: A New View on Complexity

Guest Editor: Darcy Jones

Mercury became a problem in the Bay-Delta system following the California Gold Rush (1848) when it was mined from the Coast Ranges and used extensively in placer gold mining in the Sierra Nevada (elemental mercury was used to separate the gold from soil washed from the hillsides). One environmental consequence of the historic mercury and gold mining is widespread mercury contamination of Bay-Delta sediment, water and biota. The huge amounts of mercury that exist in sediments may be transformed into its bioavailable and more toxic form, methylmercury. This results in biomagnification of methylmercury into pisciverous organisms, such as birds and humans, so mercury contamination in the Bay-Delta system has implications for environmental restoration and public health.

There have been significant advances in our understanding of mercury in the Bay-Delta system over the past fifteen or so years. For instance, we are refining previous assumptions about how and where methylation occurs. We are coming to understand that restoration of continually inundated tidal marsh may not lead to widespread transformation of mercury into methylmercury (methylation) because methylation occurs preferentially in areas that undergo periodic wetting and drying. Despite these advances in knowledge, the full picture will only come into view with continuing research, monitoring, and assessment. Advancing our understanding will, in turn, provide resource managers and water quality regulators with better tools.

This issue of the NorCal SETAC Newsletter highlights recent advances in the state of our knowledge in mercury biogeochemistry, biosentinel monitoring, and effects on birds, as well as how water quality regulators use the that knowledge when placing controls on sources of mercury. In addition to the information provided in this newsletter, you can learn more about mercury at following links.

CALFED Mercury Strategy:
http://www.science.calwater.ca.gov/pdf/MercuryStrategyFinalReport.pdf

CALFED Ecosystem Restoration Program mercury page:
http://www.delta.dfg.ca.gov/erp/wq_mercuryissues.asp

USGS Fact Sheet on Mercury:
http://ca.water.usgs.gov/mercury/fs06100.html

San Francisco Estuary Institute Fish Mercury Project:
http://www.sfei.org/cmr/fishmercury/index.htm

The UC Davis Biosentinel Mercury Program—Fact Sheet:
http://www.sfei.org/cmr/fishmercury/

Central Valley Regional Water Quality Control Board TMDL for methylmercury in the Delta:
http://www.swrcb.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/delta_hg/index.shtml

Mercury Methylation in San Francisco Bay Sediments: The Role of Reactive Mercury

Mark Marvin-DiPasquale, Ph.D.–US Geological Survey

The San Francisco Bay (SFB) and its associated watershed contain elevated levels of Hg in sediment, water and biota, ultimately resulting from the use of mercury in historic mining activities throughout the region. The organic form of mercury, methylmercury (MeHg), poses the greatest toxicological concern, as it readily bioaccumulates in aquatic food webs and reaches potentially harmful levels in top predatory fish, birds and humans. The conversion of inorganic divalent mercury (Hg(II)) to MeHg largely occurs in aquatic sediments and is facilitated by specific types of anaerobic sulfate and iron reducing bacteria. With the MeHg production process being central to the overall ecological toxicity of mercury, much research has focused on developing a better understanding as to what environmental conditions facilitate or mediate this process in natural systems.

In the simplest terms, MeHg production is a function of both a) the activity of the resident Hg(II)-methylating microbial community and b) the availability of inorganic Hg(II) to that microbial community, with both terms impacted by a large number of other environmental variables. The technique of amending and incubating sediment samples with radioactive inorganic mercury (e.g. ^{203}Hg(II)) has been successfully used in studies throughout SFB and elsewhere to assess the site-specific activity of the resident Hg(II)-methylating bacterial community via its propensity to form radiolabled Me^{203}Hg. However, while it is generally understood that a majority of the native Hg(II) pool is either bound to sediment solid phase constituents, chemically complexed with dissolved organic matter, or otherwise reacted to form any number of solid or dissolved Hg(II)-compounds, no methods currently exist to directly measure the exact composition or quantity of the native Hg(II) pool that is explicitly available for microbial Hg(II)-methylation. Subsequently, a proxy measure for this pool has been developed in which whole sediment is reacted with tin chloride under anoxic conditions for a specified limited time. Through a detailed series of assessments, the resulting operationally defined reactive inorganic mercury ($Hg(II)_R$) pool has been determined to be a reasonable surrogate measure for the actual pool of Hg(II) available for methylation, and used in conjunction with the ^{203}Hg(II)-methylation assay across a diverse suite of habitats and conditions, we have learned a great deal about the environmental controls on MeHg production.

Synthesizing data from across these multiple studies in SFB using this combined approach, the following conclusions have been reached: 1) The $Hg(II)_R$ pool size is generally a small fraction of total Hg (typically less than 5%), and is comparatively depressed under reducing sediment conditions and elevated under oxidizing conditions. 2) The central Delta has generally low MeHg production, due to a comparatively low $Hg(II)_R$ pool size. 3) Freshwater rivers, upstream of the central delta, exhibit comparatively higher MeHg production due to a higher $Hg(II)_R$ pool size. 4) Saltmarsh settings, downstream of the central Delta, are zones of enhanced MeHg production, due to very active populations of Hg(II)-methylating bacteria. 5) The presence/absence and type of vegetation in a given wetland setting exerts a strong control on MeHg production, as both microbial activities and $Hg(II)_R$ pool size are impacted by strong biogeochemical gradients that exist in the plant root zone. 6) Areas that experience periodic inundation (seasonal floodplains and tidal marshes) exhibit enhanced MeHg production compared to nearby areas that are continuously submerged. This last finding results from the reoxidation of sediments/soils during periods of drawdown or exposure to the atmosphere, which increases the $Hg(II)_R$ pool size, but limits the activity of the Hg(II)-methylating bacteria. Upon rewetting, the activity of this microbial community again increases against a backdrop of elevated $Hg(II)_R$, leading to an initial sharp increase in MeHg production. This summary of observations has many potential implications for wetland management and restoration with respect to mercury cycling and MeHg production. Future research efforts should focus on large-scale wetland restoration projects and the explicit testing of the above conclusions at expanded spatial scales, before, during and after restoration activities.

Biosentinel Mercury Monitoring in the Bay-Delta

By Darell Slotton, Ph.D., UC Davis

The Biosentinel Mercury Monitoring Program, conducted by UC Davis, is a component of the CALFED Ecosystem Restoration Program Fish Mercury Project, which commenced in Fall 2005. This is a core element of the CALFED Mercury Strategy. The purpose of the biosentinel mercury monitoring is to provide a sensitive measure of methylmercury exposure throughout the Bay-Delta watershed by using small, young, resident fish as indicators. This measure of methylmercury exposure, if done very carefully, can differentiate fine-scale locational differences in exposure as well as potential year-to-year and within-year seasonal changes that affect the aquatic food web and consumers. The biosentinel approach is based on over 15 years of methodological development at UC Davis. We are refining the approach to be a mercury feedback tool for watershed managers and for long term monitoring of that key fraction of mercury in the environment that has been converted into methylmercury and is actively moving into fish.

Mercury Seining in the Delta

We conducted annual fall sampling in 2005 and 2006 at approximately 50 sites strategically located across the watershed. Eleven representative sites were additionally sampled seasonally throughout 2006. We expanded to 20 seasonal sites in 2007. In each site-sampling event, collections of each species consist of approximately 30 replicate fish within pre-defined size ranges shown to exhibit relatively consistent mercury concentrations. Each fish is analyzed individually, providing strong statistical power. Key biosentinel species used to date include Mississippi silverside (*Menidia audens*), juvenile largemouth bass (*Micropterus salmoides*), and prickly sculpin (*Cottus asper*). We chose these species for their prevalence across different parts of the watershed and, particularly, for their representation of methylmercury exposure levels at specific locations and specific time periods. Young-of-year largemouth bass and prickly sculpin exhibit very strong site fidelity, remaining in the same area and thereby accumulating methylmercury in direct proportion to the prevailing exposure level of each site sampled. Silversides, by virtue of their very rapid growth rates, can also be used to monitor short term seasonal patterns of exposure, as new cohorts of the fish grow to sampling size (45-75 mm or 2-3 inches) every couple months during much of the year. All three of the species provide very strong measures of potential changes in exposure between years, as it is an entirely new crop of young fish that is sampled each year and these fish were exposed only to that year's conditions.

The broad, regional spatial pattern of methylmercury exposure has been consistent with that noted in prior years, with most of the highest levels in tributary areas (frequently linked to historic mining), relatively lower levels throughout the Delta, and a secondary rise moving west to San Francisco Bay. The Cosumnes River, Yolo Bypass, and Mud Slough regions were again among the most highly elevated areas. Seasonal spikes in exposure to high levels of mercury were seen at and downstream of all of these regions, as well as in the Suisun Marsh. The Petaluma Marsh was identified as another high exposure zone and the Colusa agricultural drain was indicated to be a source of elevated methylmercury exposure to the lower Sacramento River.

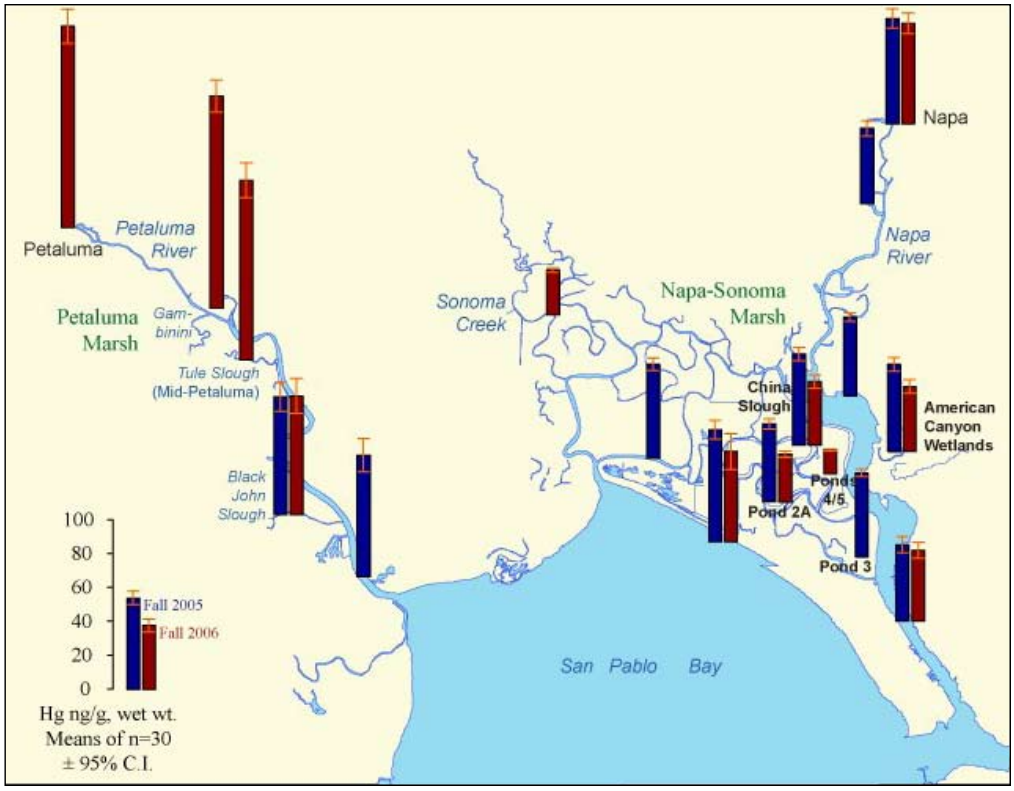
Some substantial vegetated wetland regions in the watershed were found to be relatively benign as sources of elevated methylmercury exposure, exhibiting lower

levels of fish mercury than adjacent aquatic habitats. These included the Napa-Sonoma Marsh and the naturally-restoring, vegetated portions of the North Delta. Both of these areas were characterized by permanent and/or daily tidal flooding.

Episodic flooding (of sediments that have dried) was identified as a key factor leading to elevated methylmercury exposure across the system, ranging from natural, runoff-based flooding of floodplains to managed, seasonal flooding of managed wetland ponds. Data also suggest that elevated exposures associated with some high tidal marsh habitats may be linked to wetting and drying cycles in these areas that are tidally inundated only on very high tides.

During the high flooding year of 2006, dramatic and previously unknown seasonal spikes in small fish mercury, to 2-5x ambient concentrations, were identified in several regions. Virtually all of these large, seasonal increases could be linked to episodic flooding of formerly dry sediments. Different patterns were observed in relation to the timing of flooding, including winter, rain-based runoff flooding, spring snowmelt-based flooding, and fall, managed seasonal flooding. Significant, related rises in fish mercury concentrations were seen to over 50 miles downstream of these apparent methylmercury source areas.

Data from the Biosentinel Mercury Monitoring Program highlight the importance of using sensitive, targeted feedback tools when measuring levels of methylmercury exposure across the Bay-Delta watershed. Because the technique measures the actual movement of methylmercury into fish, and does so at relatively fine scales of both location and time, it provides crucial information on the processes affecting the fate and transport of mercury in the system. This information will inform key management decisions, such as how best to design wetland and floodplain restoration projects, and how proposed changes in hydrology could affect fish mercury. Biosentinel mercury monitoring has also proven to be an ideal feedback tool with which to track the before, during, and after trajectory of exposure related to various projects, as well as the year-to-year and seasonal changes of the system as a whole.



North Bay 2005 and 2006 biosentinel mercury trends.

Mississippi silverside data demonstrate the ability to detect interannual trends and differentiate exposure levels between nearby areas and individual restoration ponds. Napa-Sonoma Marsh was shown to contain lower fish mercury than adjacent aquatic habitats, with the newest restoration exhibiting an additional reducing effect on exposure. Petaluma Marsh was identified as a zone of elevated exposure, possibly linked to episodic flooding of the extensive high marsh characteristic of that area.

Mercury Bioaccumulation in San Francisco Bay Waterbirds

Collin Eagles-Smith, Ph.D., US Geological Survey

Josh Ackerman, Ph.D. US Geological Survey

Waterbirds in the San Francisco Bay Estuary represent a sensitive ecological endpoint for mercury exposure. Current plans to restore habitat in the Bay and Delta may result in changes to waterbird abundance and distribution, as well as methylmercury production. However, the relative risk of mercury bioaccumulation to different species of waterbirds is complicated by environmental factors such as the temporal and spatial variability in mercury loading and conversion to methylmercury, ecological factors such as habitat selection, space use, and trophic ecology, and physiological factors such as variations in sensitivity to mercury among species. We are currently studying mercury bioaccumulation and risk in four species of waterbirds breeding within the estuary, each with different dietary or habitat use characteristics. American avocets (*Recurvirostra americana*) and black-necked stilts (*Himantopus mexicanus*; Fig. 1) primarily forage on invertebrates found in the shallow-water salt ponds, marshes, and tidal flats. Forster's terns (*Sterna forsteri*) and Caspian terns (*Sterna caspia*) are obligate fish eaters that forage in more open-water habitats. Forster's terns use salt ponds, marshes, and tidal flats as foraging areas, whereas Caspian terns tend to use the open bay as well. One goal of our study is to determine foraging characteristics and habitats that are associated with elevated risk of mercury exposure to different waterbird species. Our initial results for breeding birds indicate that, blood total mercury (THg) concentrations (geometric mean ± SE; ppm ww) are highest in Forster's terns (1.82 ± 0.19), followed by black-necked stilts (0.94 ± 0.13), Caspian terns (0.81 ± 0.15), and American avocets (0.51 ± 0.08). These concentrations approach or exceed toxic threshold levels reported for other waterbird species, and tend to increase with time spent in the estuary.

Using radio-telemetry and stable isotope techniques we assessed habitat use and trophic ecology of each species to explain patterns observed in mercury concentrations. Although Caspian terns generally forage on larger fish, their mercury concentrations were less than half those of Forster's terns. However, Forster's terns mainly foraged in salt ponds and marshes along the Bay's margins (Fig. 2), where methylation rates may be elevated. Caspian terns tend to forage more often within the open Bay. Furthermore, black-necked stilt mercury concentrations were substantially higher than avocets – even though their nitrogen isotope ratios (12.35 ± 0.27‰) indicated that they foraged at a lower trophic position than avocets (13.25 ± 0.31‰). Our telemetry and carbon isotope data revealed that stilts are much more dependent upon vegetated marshes than avocets, which use tidal flats to a higher degree. As suggested by others in this newsletter (M. Marvin-DiPasquale), methylmercury production appears to be elevated in areas with substantial wetting and drying cycles, as well as those with high plant-root density, such as marshes. Our results indicate that mercury concentrations differ among ecologically similar waterbird species due to differences in micro-habitat and prey selection, and suggest that mercury concentrations in several waterbird species should continue to be monitored in the San Francisco Bay-Delta as wetlands are restored.

Delta Methyl Mercury TMDL and Basin Plan Amendment

Chris Foe, Ph.D., Central Valley Regional

Water Quality Control Board

The Sacramento-San Joaquin Delta is on the Federal Clean Water Act 303(d) list of impaired water bodies because of elevated levels of mercury in fish. The Clean Water Act requires States to develop a Total Maximum Daily Load (TMDL) report to the U.S. EPA for listed water bodies. The Central Valley Regional Board submitted a draft methyl and total mercury TMDL report to the U.S. EPA in the summer of 2006 (Wood et al., 2006). The TMDL report describes the mercury problem, recommends safe fish tissue level(s) to protect people and wildlife consuming delta fish, major sources of methyl and total mercury to the Delta, a linkage analysis to determine the aqueous methyl mercury concentration needed to achieve safe fish concentrations, and recommended reductions in mercury loads from all sources to meet the fish target. An important finding in the TMDL report is that there are statistically significant positive correlations between average unfiltered methyl mercury concentrations in water and in aquatic biota. Similar relationships have been observed elsewhere (Brumbaugh et al., 2001;Slotton et al., 2003;Tetra Tech, 2005). The relationship suggests that aqueous unfiltered methyl mercury concentrations are an important factor controlling methyl mercury bioaccumulation in the aquatic food chain. Unfortunately, limited information exists on how to control methyl mercury production and export from major Delta sources.

One factor influencing methyl mercury production in sediment is its inorganic mercury content. Methyl mercury is produced in sediment by sulfate reducing bacteria (Compeau and Bartha, 1985; Gilmour et al., 1992). The evidence that the total mercury content of sediment is a factor controlling methyl mercury production is three fold. First, the methyl to total mercury ratio increased statistically with an increase in the total mercury content of sediment in several hundred randomly selected samples collected from the Delta (Heim et al., 2007). However, the overall amount of variation explained was small (R2 =0.18). Interestingly, the R2 increased when the analysis was restricted to specific habitats. For example, the R2 increased to 0.7 for marshes suggesting that other site-specific factors might be as or more important than the mercury content of the sediment. Second, increasing concentrations of inorganic mercury were amended into intact sediment cores brought back to the laboratory and the evolution of methyl mercury monitored. The efficiency of the conversion of inorganic to methyl mercury increased in a linear fashion with increasing total mercury in the cores (Bloom 2003; Rudd et al., 1983). Finally, a review of the literature demonstrates that mercury concentrations in fish decline in mercury-contaminated waterways after control measures are instituted to reduce incoming loads of total mercury (as reviewed in Wood et al., 2006). Together the above results suggest that control programs that reduce incoming loads of inorganic mercury will reduce the production of methyl mercury in sediment and subsequent biomagnification in the aquatic foodchain. The results also imply that inorganic mercury control programs may be most effective if focused on reducing incoming loads to sensitive mercury habitats like marshes.

The Porter-Cologne Water Quality Control Act requires Regional Boards to develop Basin Plan Amendments to eliminate water quality impairments. The amendment will include a water quality objective, implementation plan and compliance schedule. Staff from the Central Valley Regional Board is scheduled to present the Board a draft mercury basin plan amendment in the fall of 2007. The draft amendment can be read at http://www.waterboards.ca.gov/centralvalley/programs/tmdl/Delta_hg/delta-bpa-lang.pdf. The purpose of the amendment is to lower fish mercury tissue levels in the Delta to safe concentrations for human and wildlife consumption. The proposed tissue objective is being set at a concentration so that people can safely eat up to four meals a month of a combination of trophic level three and four fish. Examples of trophic level three fish in the Delta include salmon and blue gill while trophic level four fish are catfish and bass. The Board may elect to adopt a different fish tissue objective that would insure

a higher safe human consumption rate. If so, this would reduce the aqueous methyl mercury target, increase allocations to dischargers and increase the ultimate cost of the control program.

The schedule for the recommended implementation plan is divided into two phases. Phase I would be for about 7 years (2008-2014) while Phase II would run for about 16 years (2014-2030). Phase I is intended to be a study period for dischargers to collect more information on methyl mercury concentrations in their effluent and develop management practices to reduce discharge concentrations to levels required in the Basin Plan amendment. At the end of Phase I, the Regional Board would review all the management plans at a public meeting and decide whether the existing load allocations mandated in the Phase I Basin Plan amendment are achievable and the compliance schedule appropriate. Adjustments would require changes to the Phase I Basin Plan Amendment. Staff will recommend that, if a discharger does not participate in studies and is unable to recommend management plans to meet the assigned load reductions, the Phase I allocation and time schedule apply.

The mercury basin plan amendment for the San Francisco Regional Water Quality Control Board requires an inorganic mercury load reduction from the Central Valley of 110 kg/yr. Half of this reduction is to be achieved within 10 years of adoption of the Central Valley Phase I mercury basin plan amendment. Central Valley Regional Board staff intends to meet the reduction by concentrating on reducing inorganic mercury from watersheds that contribute a disproportionate amount of the total mercury and discharge to sensitive downstream environments. An example is the Cache Creek watershed. The watershed is about one twentieth of the landmass of the Sacramento Basin but discharges about a quarter of all the inorganic mercury entering the Delta (Wood et al., 2006). Mercury from Cache Creek is released to the Yolo Bypass. The Yolo Bypass floods every other year for about two months and is being actively restored to a combination of seasonal and permanent wetlands by a consortium of state and private parties. Studies conducted in the winter of 2005 and 2006 demonstrated that the flooded Bypass produced about half of all the methyl mercury exported from the Sacramento Basin. This is surprising as the Bypass is only 60,000 acres or about one third of one percent of the landmass of the Sacramento watershed. Clearly, control programs to reduce inorganic mercury loads from Cache Creek could be important in meeting the San Francisco Bay area total mercury allocation to the Central Valley and also in reducing methyl mercury production in the Bypass and resulting downstream concentrations in water and aquatic biota in the Delta.

For more information contact Chris Foe (916-464-4713) or Patrick Morris (916-464-4621)

Literature Cited.

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Judy Nedoff

Judy received her bachelor's degree in Botany at the University of California, Berkeley, in 1980, and her Master's Degree in Botany/Plant Science at the University of California, Riverside, in 1983. She has been in consulting since 1984, working in the areas of site investigation and cleanup, analytical chemistry/quality assurance, and ecological and human health risk assessment. Judy has conducted ecological and human health risk assessments for industrial, commercial, and governmental clients at sites such as former oil refineries, military bases, former chemical manufacturing and dry cleaning facilities, and Superfund sites, among others. Judy joined ARCADIS in 2005, where her activities include site investigation/remediation, permitting, and risk assessment.

Darcy Jones

Darcy received a BS in biology with an emphasis in microbiology from Colorado State University, and a MPH in environmental health from San Diego State University. After working for a short time in commercial and municipal laboratories, Darcy worked at the San Diego Regional Water Quality Control Board on National Pollutant Discharge Elimination System (NPDES) permits, monitoring programs, and enforcement orders. Darcy served on the Technical Advisory Committee and Steering Committee for the Southern California Coastal Water Research Project (SCCWRP) monitoring efforts in the Southern California Bight. After leaving San Diego, Darcy worked for USEPA, Region 9, and the State Water Resources Control Board where she worked on water quality standards for mercury, bacterial indicators, and a policy regulating discharges to effluent dominated water bodies.

Darcy currently works for the CALFED Science Program on the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP), a project that is developing conceptual models that articulate the current state of scientific knowledge in the Bay-Delta system. She is also managing editor for the Science Program's State of Bay-Delta Science 2008, and serves as a liaison on water quality issues for the Science Program.

Eugenia McNaughton

Eugenia received her Ph.D. in biology from U.C. Santa Cruz in 1989. After graduating, she worked in the Bay Area for Steve Hansen & Associates (Avon) and MEC Analytical Laboratory (Tiburon), performing all aspects of toxicity testing for municipal and industrial clients participating in the San Francisco Bay Effluent Toxicity Testing Program under the National Pollution Discharge Elimination Program until 1993. She was elected to the Bolinas Community Public Utility Board in 1989, and served as its president from 1991 to 1997. In 1994, she spent 6 months as a Fulbright Scholar at the Agricultural Research Institute in Nicosia, Cyprus, during which time she presented and conducted U.S. toxicity test methods on various types of water bodies on both the Greek and Turkish sides of the island. McNaughton joined the U.S. EPA Region IX (San Francisco) Quality Assurance Office in 1995. She reviewed all types of QA documents related to water projects, developed guidance documents appropriate for smaller EPA grantees conducting environmental sampling, and represented EPA during the development and implementation of the Grassland Bypass Project (1995 to the present), which resulted in the first non-point source TMDL, for selenium, for agriculture in California and the U.S. McNaughton moved to the Water Division in 1996 to oversee the planning of the City of Mexicali, Baja California Wastewater Treatment Plant (Mexicali II) and various water quality related projects throughout the Lower Colorado River Basin. In 2005, she became Manager of the Quality Assurance Office in the Management and Technical Services Division of EPA. She continues to work on selenium-related projects, particularly in the effort to develop acute and chronic aquatic-dependent wildlife criteria for the State of California. I joined SETAC in 1989 and the Northern California Chapter as it was formed. I participated in and gave presentations about projects through the first years of my work at EPA at national and regional meetings. Once I became a member of the Water Division's U.S.-Mexico Border Team, however, given the amount of travel the job required, participation in professional organizations became very difficult to fit into my schedule. I'd like to reconnect to the profession and serving on the Northern California Chapter Board allows me to give something back to the organization that has helped me learn so much in

my post-graduate years.

Chris Pincetich

Chris received his Bachelor's degree in Marine Biology from UC Santa Cruz in 1996 and his Ph.D. in Pharmacology and Toxicology from UC Davis in 2003, with an emphasis in aquatic toxicology. He worked with Drs. David Hinton and Ron Tjerdeema at UC Davis to develop methods to monitor sublethal metabolic stress responses in early life stages of fish exposed to pyrethroid or organophosphate pesticides. As a graduate student, he directed an internship to teach aquatic toxicology principles and test methods to UC Davis undergraduates, and then accompanied these interns to Central Valley high schools to perform water quality testing with the high school students. Chris then went to work as a consultant and lab assistant for San Francisco Baykeepers, helping to establish a fecal coliform monitoring program for San Francisco Bay marinas. He continued his work as a consultant for Pacific EcoRisk, serving for several years as Special Projects Director. There, he was responsible for overseeing a wide variety of toxicity testing and water quality monitoring projects, from monitoring storm water discharges into marine protected areas to the development of site specific water quality criteria. Chris recently served as the Biology Laboratory Supervisor at the East Bay Municipal Utility District (EBMUD), overseeing the regulatory compliance monitoring necessary for the water and wastewater at EBMUD.

Chris has benefited from SETAC both as a student and in his professional career. His graduate work was awarded honors by NorCal SETAC, and Chris served on the NorCal SETAC Board as the Student Representative from 2001-2002. He was a short course instructor at the annual SETAC NA conference for many years, and is a member of the SETAC NA Educational Committee. Chris has had professional working relationships with many current members of NorCal SETAC, and is pleased and honored to serve on the NorCal SETAC Board of Directors.

Beckye Stanton

Beckye Stanton joined California Department of Fish and Game, Office of Spill Prevention and Response (DFG-OSPR) in November 2004 as an Associate Toxicologist in the BRAC/CERCLA unit. She worked with Department of Defense and other state and federal agencies to achieve adequate site characterization and remediation of military sites that is protective of fish and wildlife. She also provided technical toxicology support on private sites where DFG-OSPR is involved. She recently joined DFG-OSPR's Natural Resource Damage Assessment group as a Staff Toxicologist.

From 2001 to 2004, she worked on military base cleanups and natural resource damage assessments (NRDA) at private sites as part of the Environmental Contaminants Division of U.S. Fish and Wildlife Service in Sacramento. Her education background includes a B.S. in Biology from Calvin College, MI in 1996 and a Ph.D. in Toxicology from U.C. Davis in 2002. Beckye was involved with NorCal SETAC as a U.C. Davis student, and continues to do so as a government employee.

Bruce Joab

Bruce Joab received a B.S. degree in environmental toxicology from U.C. Davis in 1994 and his M.S. degree in environmental toxicology from Clemson University in 1996. Since 2003 he has worked in the California Department of Fish and Game, Office of Spill Prevention and Response (CDFG-OSPR), where he is a staff environmental scientist. Mr. Joab coordinates the Scientific Study and Evaluation Program for OSPR and is a case lead on several natural resource damage assessments for spill-related injuries to wildlife and habitats. He also performs ecological risk assessment reviews for CDFG-OSPR. Before joining CDFG-OSPR he worked at Cal/EPA, and prior to that he was an environmental consultant working on ecological risk assessment projects.

Susan Klosterhaus

Susan recently joined the San Francisco Estuary Institute, where she works primarily on organic chemical contaminant projects for the Regional Monitoring Program. Susan earned her Ph.D. from the University of Maryland's Marine Estuarine Environmental Sciences Program with an emphasis in environmental chemistry in April 2007. Her dissertation research focused on the bioavailability of sediment-associated organic chemical contaminants, particularly the brominated diphenyl ether flame retardants, and the processes that control their accumulation in aquatic food webs. Prior to moving to the Chesapeake Bay area, Susan was manager and research associate in the sediment toxicology

laboratory at the University of South Carolina School of Public Health where she studied the toxicity and bioaccumulation of several classes of organic contaminants in benthic meiofauna. She received her M.S. in Public Health in 2001 and B.S. in Marine Science in 1995, both from the University of South Carolina.

Bobbye Smith

In July 2007, Bobbye started a new phase of her career, in the field of sustainable events planning consultancy. Bobbye worked for the US Environmental Protection Agency (EPA), Pacific Southwest Region (San Francisco, CA) from 1994 to 2007. Prior to that, she worked for the San Francisco Regional Water Quality Control Board and a small environmental consulting firm.

At EPA's Region 9, she worked in the Superfund Division, as a Remedial Project Manager (RPM), and ecologic risk assessor for Navy sites, and from 1996 to 2000, as Chief of the Air Force Cleanup Section, overseeing cleanup of federal facility sites. In 2000, she accepted the position of Regional Science Liaison to the Office of Research and Development (ORD). In this role, she was responsible for outreach and science communication to the Region, States, Tribes and stakeholder groups, including academia, industry and the public, in areas of emerging scientific interest. She managed three ORD-funded research programs: Regional Applied Research Effort (RARE), Regional Methods, and Regional Research Partnership Program, and was the ORD lead in Region 9 for SBIR (Small Business Innovation Research), STAR (Science To Achieve Results), and various EPA technology programs.

Since 2000, Bobbye has organized and executed more than twenty national workshops on diverse environmental science topics including, endocrine disrupting chemicals, pharmaceuticals and personal care products, biosolids and manure management, critical habitats, water quality for the protection of wildlife, emerging aquatic pathogens, and TMDLs (Total Maximum Daily Loads), as well as scientist-to-scientist meetings for EPA's STAR and SBIR programs and Region 9's Science Council. In addition, she helped develop EPA's Agency-wide training for staff from EPA, States, Tribes and local agencies, in the application of so-called "omics" technologies, e.g., techniques for monitoring aquatic endocrine disruptors, microbial source tracking, field identification of genetically modified crop plants, and design and application of microarray-based environmental exposure tools, so-called gene chips. From 2002 to 2007, she assisted with the technology transfer of an ORD gene-expression assay that is currently being considered by the State of California to assess exposure of aquatic organisms to endocrine active compounds.

As a member of NorCal SETAC since the mid-1990's (and past Board member), I've always enjoyed the stimulation of scientific exchange in our community. In my new role as a sustainable events consultant, I would like to give back to the membership by assisting with the design and execution of the 2008 Annual Meeting. The NorCal SETAC Chapter has continually been at the forefront of the environmental movement, and the Annual Meeting provides a perfect opportunity to "walk the walk" of sustainable events, by reducing our Chapter's environmental footprint.

David Ostrach

David received his bachelor's degree in marine biology and neuroethology from UC San Diego and his Ph.D. in Comparative Pathology from the School of Veterinary Medicine at UC Davis.

His research career began at Scripps Institution of Oceanography investigating microbial degradation of crude oil spills prior to construction of the Alaska pipeline. This was followed by working on food chain research investigating population growth, feeding, development, and rejection behavior in the copepod Calanus pacificus. He took a position as Associate Research Scientist and Manager of the Aquatic Toxicology Laboratory at Science Applications Inc. /JRB Associates, Environmental Chemistry and Geochemistry Division in La Jolla, Ca. In that position he was responsible for the design and development of an aquatic toxicology facility including the drafting of original laboratory system plan for static and flow-through testing as well as marine and fresh water organism culture.

David started and led an environmental consulting firm, Bioaquatic Consultants that specialized in the

development of protocols for performance of compliance monitoring, testing for aquatic toxicology as well as terrestrial impact studies. He then entered the aquaculture business by starting the Lazy O Fish Ranch in Descanso, CA, a 28 acre aquaculture facility involved in the production and sale of various species of fish, algae and plankton as well as various organisms for use in aquatic toxicology testing/bioassays.

David then took a position at UC Davis where he has been working on various environmental and cancer research studies since 1987. He designed and supervised the construction of the Aquatic Toxicology Research Laboratory Facility building at UC Davis. As its first director he developed and implemented inland surface water toxicity testing along with state of the art environmental research programs. Currently the main focus of his laboratory at UC Davis is to conduct interdisciplinary research on striped bass and factors associated with its long term population decline. Recently his laboratory has been involved in the IEP's effort to determine factors responsible for the Pelagic Organism Decline in the San Francisco Estuary.

In 2005 David merged his laboratory with that of Frank Loge to form the Pathobiology, Conservation and Population Biology laboratory in the Center for Watershed Sciences at the John Muir Institute of the Environment and Department of Civil and Environmental Engineering at UC Davis. This brings a powerful modeling component to the laboratories capabilities. Efforts are underway developing an individual and life cycle ecological forecasting model for striped bass in this estuary. David's overall program goals are to better understand the long-term effects of contaminant exposure, climate change and multiple stressors on fish populations and ecosystem health.

Chris Vulpe

Chris Vulpe received his undergraduate degree from MIT, a Ph.D from UC San Francisco in 1994, and his M.D. from UC San Francisco in 1996. After a postdoctoral position in molecular genetics at UCSF, he joined the faculty of the Division of Nutritional Sciences and Toxicology in College of Natural Resources at UC Berkeley in 1998. His research interests focus on ecotoxicogenomics and current projects include developing microarrays for assaying exposures in aquatic systems. He currently has active grants from the National Science Foundation, National Institutes of Health, National Institute of Environmental Health Science, and the US Army Corps of Engineers. He is a reviewer for the NSF, NIH, EPA, and UC Discovery granting agencies. He is a reviewer for multiple journals including Nature Genetics, Journal of Biological Chemistry, BMC Genomics and BMC Bioinformatics. Chris has been involved in NorCal SETAC for many years and has mentored undergraduate and graduate students in projects that have been presented at annual meetings.

Charlene Ng

Charlene Ng received a B.S. in Biological Sciences and a B.A. in History at Stanford University in 2002. She has had a broad education, which include research experience in labs working on developmental biology, cancer, freshwater ecology, and marine biology.

She is currently a second year graduate student in the Integrative Biology Ph.D. Program at the University of California, Berkeley. Co-advised by Prof. Mary Power and Professor Donald Weston, she is interested in food web dynamics, aquatic ecology, and ecotoxicology. She is currently working on pyrethroid toxicity and hopes to integrate developmental biology, molecular biology, and food web dynamics into her research.

Charlene is serving as a student representative on the NorCal SETAC Board of Directors in order to voice her concerns as a student and learn more about NorCal SETAC's most current pressing concerns. She hopes to serve the Board by offering her planning and management skills during her term.

Northern California Regional Chapter
Society of Environmental Toxicology and Chemistry
P.O. Box 5061 Fair Oaks, CA 95628
(866) 251-5169x1108 • info@norcalsetac.org • http://www.norcalsetac.org

2008 MEETING REGISTRATION AND MEMBERSHIP APPLICATION FORM

NorCal SETAC 18th Annual Meeting, May 7-8, 2008, UC Berkeley, CA

Please Print

Name	*Phone*	***NorCal SETAC Office Use Only***
Affiliation	*Fax*	*Date Rec'd*
Street	*Mobile/Pager*	*Processed*
City *State* *Zip*	*E-mail*	*To Membership*

APPLICATION FOR MEMBERSHIP

☐ Membership Renewal ☐ Already paid for 2008 Membership (skip to Short Course/Registration section)
☐ New Member ☐ Non-Member (skip to Short Course/Registration section)

CATEGORY OF EMPLOYER (Check one):
☐ Government ☐ Consultant ☐ Academia (Professional) ☐ Non-Profit Organization
☐ POTW ☐ Business/Industry ☐ Student ☐ Other _____

MEMBERSHIP APPLYING FOR (Check one):
☐ Professional (=$20/calendar year) ☐ Student (=$10/calendar year)

Membership Dues (see above for payment amount) $ _____

Advanced Registration must be RECEIVED by April 30, 2008, all others must register onsite

SHORT COURSE AND MEETING REGISTRATION[1]

SHORT COURSES

		Professional Member[2]	Non-Member	Student Member[2]	Student Non-Member	
Wednesday May 7, 2008						
Ecological Risk Assessments in California (half-day)	Received by 04/30/08	☐ $50	☐ $75	☐ $35	☐ $55	$ _____
	Onsite[1]	☐ $75	☐ $100	☐ $50	☐ $75	$ _____
CETIS (Toxicity) Software and Data Interpretation (full-day)	Received by 04/30/08	☐ $100	☐ $125	☐ $35	☐ $55	$ _____
	Onsite[1]	☐ $125	☐ $150	☐ $50	☐ $75	$ _____
Analytical Chemistry Methods (pharms) & Interpretation (half-day)	Received by 04/30/08	☐ $50	☐ $75	☐ $35	☐ $55	$ _____
	Onsite[1]	☐ $75	☐ $100	☐ $50	☐ $75	$ _____
Wednesday Box Lunch = $12 (incl. Iced tea)* choice of: ☐ Omnivore ☐ Vegetarian						$ _____

MEETING REGISTRATION

	Professional Member[2]	Non-Member	Student Member[2]	Student Non-Member	Student Volunteer	
Thursday May 8, 2008						
Pre-register by 04/30/08	☐ $25	☐ $45	☐ $10	☐ $25	☐ FREE	$ _____
Onsite[1]	☐ $35	☐ $55	☐ $20	☐ $30		$ _____
Thursday Evening Reception (check to attend; **no charge**)					☐	$ FREE
Thursday Box Lunch = $12 (incl. Iced tea)* choice of: Omnivore ☐ Vegetarian						$ _____

* Box lunch for students at **no charge**

PAYMENT TOTAL $ _____

PAYMENT OPTIONS

Payment type: ☐ Check (make checks payable to **NorCal SETAC**) ☐ Money Order ☐ VISA ☐ Master Card ☐ AMEX
Card No. _____ Exp. _____ Credit Card ID No. [3] _____

Billing Address (if different from above): _____

Mail this form along with payment to: NorCal SETAC, P.O. Box 5061 Fair Oaks, CA 95628 **OR** **e-mail** this form with credit card information to: Bruce Joab [bjoab@OSPR.DFG.CA.GOV]

1. Cancellations must be received no later than 4/30/08 for a full refund. No refunds will be given after 04/30/08. **REGISTRATIONS RECEIVED 05/1/08 THROUGH 05/09/08 WILL NOT BE PROCESSED – you must register ONSITE IF NOT BY 04/30/08.**
2. If you already paid your 2008 membership dues or you are paying your dues with this form, you may register for the meeting as a member.
3. The Card Identification Number is the group of numbers immediately following your credit card number found on the BACK of your card on the signature strip. These numbers are used by your credit card company to help prevent fraud. Because the Card ID number is not printed on your receipts, it helps ensure that someone is not using your credit card information fraudulently. Note: The digits are printed on your card, rather than stamped in the plastic like the digits in your credit card number. If you do not provide this information, the cost to NorCal to provide credit card payment options is significantly higher.

Special Accommodation Requests: Persons requesting special accommodation for the meeting must submit the request to Bobbye Smith (bobbyesmith@gmail.com) no later than 04/30/08. In order to make necessary arrangements to accommodate your special needs, all requests should be submitted as soon as possible.

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2008 SUSTAINING MEMBERSHIP & STUDENT SCHOLARSHIP CONTRIBUTIONS FORM

Please Print

Name	*Phone*	***NorCal SETAC Office Use Only***
Affiliation	*Fax*	*Date Rec'd*
Street	*Mobile/Pager*	*Processed*
City *State* *Zip*	*E-mail*	*To Membership*

SUSTAINING MEMBERSHIP & STUDENT SCHOLARSHIP CONTRIBUTIONS

CATEGORY (Check one):

☐ Government ☐ Consultant ☐ Academia (Professional) ☐ Non-Profit Organization
☐ POTW ☐ Business/Industry ☐ Individual ☐ Other_____

SUSTAINING MEMBERSHIP (Check one):

☐ GOLD (=$1500/calendar year) ☐ SILVER (=$750/calendar year) ☐ BRONZE (=$350/calendar year) ☐ OTHER _____ (contact Board for other options)

STUDENT SCHOLARSHIPS (Check one):

☐ NAMED GRADUATE (=$3000) ☐ NAMED UNDERGRADUATE (=$1000) ☐ POOLED NORCAL SETAC (<$1000) ☐ OTHER _____ (contact Board for other options)

TOTAL CONTRIBUTION $_____

PLEASE NOTE: All contribution options noted above include complimentary membership in NorCal SETAC for the person listed above

PAYMENT OPTIONS

Payment type: ☐ Check (make payable to **NorCal SETAC**) ☐ Money Order ☐ VISA ☐ Master Card ☐ AMEX

Card No. _____ Exp. _____ Credit Card ID No.[1] _____

Billing Address (if different from above):

_____

Mail this form along with payment to: NorCal SETAC, P.O. Box 5061 Fair Oaks, CA 95628

OR **e-mail** this form with credit card information to: Bruce Joab [bjoab@OSPR.DFG.CA.GOV]

1. The Card Identification Number is the group of numbers immediately following your credit card number found on the BACK of your card on the signature strip. These numbers are used by your credit card company to help prevent fraud. Because the Card ID number is not printed on your receipts, it helps ensure that someone is not using your credit card information fraudulently. Note: The digits are printed on your card, rather than stamped in the plastic like the digits in your credit card number. If you do not provide this information, the cost to NorCal to provide credit card payment options is significantly higher.

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APPLICATION FOR MEMBERSHIP

■ Membership Renewal ☐ New Member

Please Print Neatly (Information will appear in Membership Directory)

Name	Telephone
Affiliation	Fax
Street	Cell Phone
City	Pager
State Zip	E-mail

CATEGORY OF EMPLOYER (Check one):

☐ Government ☐ POTW ☐ Academia (Professional)
☐ Business/Industry ☐ Consultant ☐ Student (Grad./Undergrad.)
☐ Non-Profit Organization ☐ Other _____

MEMBERSHIP APPLYING FOR (Check one):

☐ Regional ($20/calendar year) ☐ Student ($10/calendar year)
☐ Active, also a member of SETAC North America ($20/ calendar year) ☐ Sustaining ($225/calendar year)
☐ Emeritus (Board approved only)

PAYMENT TYPE (Check one):

☐ Check/Money Order
☐ VISA Credit Card# _____ Exp. Date _____
☐ MasterCard Identification #** _____
☐ American Express Signature _____ Date _____

**The card identification number is the group of numbers immediately following your credit card number found on the BACK of your card on the signature strip. These numbers are used by your credit card company to help prevent fraud. Because the card ID is not printed on your receipts, it helps ensure that someone is not using your credit card information fraudulently. Note: the numbers are printed on your card rather than stamped in the plastic like the digits in your credit card number. If you do not provide this information, the cost to NorCal to provide credit card service payment options is significantly higher.

Mail this form along with payment made payable to: NorCal SETAC, P.O. Box 5061 Fair Oaks, CA 95628
NOTE: Please do not send cash or purchase requisitions. Your cancelled check will serve as your receipt.